SMALL BUSINESS

Simple Tools Complicated

by Lynn Monnot

In 50 Words Or Less

- **Wausau Window and Wall Systems saved millions of dollars by using simple Six Sigma tools combined with lean.**
- **The method brought processes in control and advanced a culture of continuous improvement and customer satisfaction.**
- **Results include productivity increases of 28% at one plant.**

In its third year of lean/Six Sigma efforts, Wausau Window and Wall Systems in Wisconsin has passed along millions of dollars in savings to its customers and shareholders by reducing inventories, material costs and setup times and by improving cycle times.

While Six Sigma is famous for application of advanced statistical tools and techniques, Wausau attributes much of its success to using simpler Six Sigma tools that bring processes in control and help advance the culture toward one of continuous improvement and customer satisfaction.

Commitment to Customers

Wausau engineers window and curtainwall systems for architectural and institutional construction applications. For more than 45 years, the company and its extended team of manufacturers' representatives have worked with architects, building owners and contractors to design custom windows and wall systems for projects such as California's greenest state government building at the Capitol Area East End Complex; Chicago's historic Park Tower condominiums; the Illinois Institute of Technology Campus Center, which won an international design

Improve Processes

TRIM DEPARTMENT BEFORE (left) AND AFTER By identifying non-value added steps in its process, a Wausau improvement team freed up floor space, increased departmental capacity, reduced trim bid prices for customers and increased productivity 100%.

award; Florida's hurricane resistant Tallahassee Community Hospital; Iowa's blast resistant Des Moines Federal Building; and New York's JFK AirTrain light rail stations.

Wausau handles everything from initial design and engineering to manufacturing, testing, finishing installation and delivery of custom or pre-engineered window and curtainwall products. This enables the company to have control over scheduling and budgets. Its five facilities for fabrication and finishing can accommodate nearly any project.

Precision is required in everything from the corner joinery to sealants and gaskets to in-house glazing. Meeting stringent industry requirements for architectural glazing systems, Wausau conducts intensive testing of custom mock-ups and standard product certification inspections in its two in-house test chambers. As evidence of the company's commitment to quality, Wausau offers warranties up to 10 years—among the longest in the industry.

Wausau, with 533 employees, is owned by Apogee Enterprises Inc., a publicly held U.S. corporation traded on NASDAQ. Apogee serves the display, automotive and architectural glass markets. Its financial strength has allowed Wausau to reinvest in the continuous improvement of its engineering capabilities and manufacturing operations.

"We listen closely to the voice of our customers and try to anticipate their needs. As part of Apogee's businesswide initiative, our Six Sigma efforts focus on achieving better quality at a lower cost," says Alan Verploegh, Wausau's CEO and president.

Lean, part of the same company initiative, complements Six Sigma by omitting waste and reducing process time. Together, Six Sigma and lean provide a process that uses fact based analytical tools and methodologies to prevent defects and eliminate unnecessary excess in products, processes and services. Verploegh says, "This further reduces cycle times and helps manage costs, which ultimately allows us to generate greater value for customers."

Tools of Change

Wausau's lean/Six Sigma journey began in the spring of 2001 and is the largest business improvement process ever undertaken within the company. During four waves of Black Belt (BB) training throughout that first year, Wausau trained 12 BBs, or about 2% of all employees. Three of those people

went on to become certified BBs through Apogee, and one became an ASQ certified Six Sigma BB.

Wausau employs the services of Air Academy and Associates for its lean and Six Sigma training. Air Academy stresses a process called PF/CE/CNX/SOP to bring processes in control. The abbreviation is broken down in the following way:

PF = process flow. Draw a map or flowchart of the process. This helps point out sources of waste, decision points, loops and flow of materials and information.

CE = cause and effect. Brainstorm potential sources of variation for the outputs in the process. This promotes out of the box thinking and employee involvement.

> "Employee involvement is the key; implement their ideas."

CNX = constant, noise and experimental item. Classify all sources of variation: A constant is something that can be controlled or held constant. Noise is something that cannot be controlled or something chosen not to be held constant. Experimental items are those that can be tested at several different options or settings.

SOP = standard operating procedure. For all the C's or constants on the CE, write an SOP explaining how to hold that item constant.

Using the basic idea of PF/CE/CNX/SOP and reducing variation, Wausau has been able to bring processes in control, meaning they now are predictable. PF/CE/CNX/SOP is always the first tool set used at the beginning of a lean or Six Sigma project at Wausau.

Visible Victories

One of the first Six Sigma projects at Wausau Window and Wallexamined its trim department's productivity. This department manufactures installation accessories, anchors, decorative aluminum components and panning to prepare openings for replacement or new window installation.

BBs, the technical experts on this project, were challenged with improving the department's productivity by a modest 5%. The team ended up increasing productivity 100%, freeing up floor space, increasing departmental capacity and, only one month after the project's completion, decreasing trim bid prices for customers.

"These improvements directly benefit customers and help make the company more competitive. They also create visible change in the workplace that leaves a positive impression when customers tour and are a daily source of worker pride," notes BB Kevin Rell.

This accomplishment began with a process flowchart of trim department activities identifying which steps in the process added value to the product and which did not. The team worked to eliminate or at least reduce the nonvalue added process steps.

"The CE tool engaged the entire department in collectively brainstorming and sharing ideas on potential sources of variation," Rell explains. "We then determined which variables could be controlled as constants, which were noise and which were experimental. Next, SOPs were written for the variables that could be controlled."

Simple Steps to Savings, Safety and Success

Using these simple tools and processes, Wausau's Plant 3 initiative also reduced lead times and labor costs for its rolling and hung window products. In addition to these savings, customers benefit from improved material handling, shipping and packaging practices that allow faster, safer deliveries.

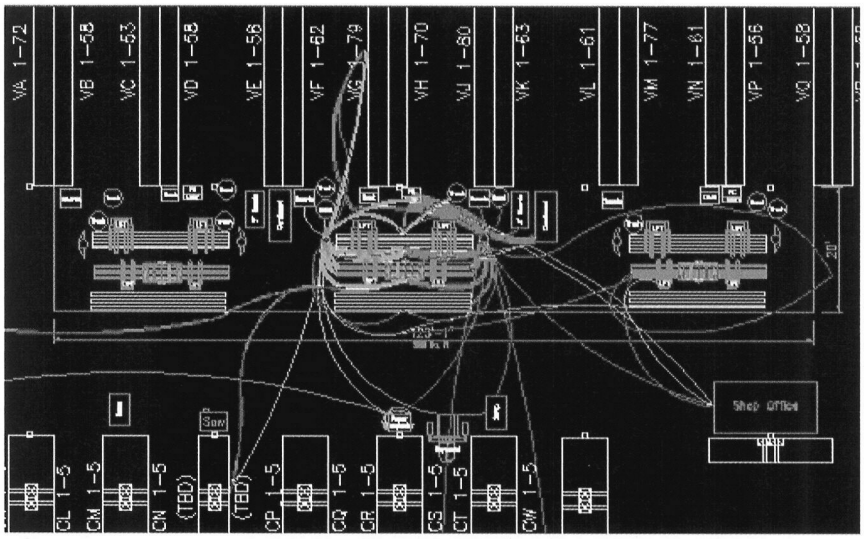
"It used to take five or six hours for a customer to unload the windows from a typical truckload one at a time. Now, using our new packaging system, they can accomplish this in about 45 minutes while maintaining the correct sequence of windows and accessories," explains Doug Holmberg, Wausau's director of quality assurance.

"Our new system also eliminates tasks that do not add value, streamlining material handling from our vendors to our operations and in our fabrication," Holmberg continues. "This has helped reduce our labor costs by 10 to 20% and to contain potential price increases caused by rising labor and

material costs. All these steps contribute to our customers' competitiveness and their bottom lines. The system allows us to load the trucks faster and get the materials to jobsites more quickly. The reduced time and handling further contribute to safe and damage free delivery."

Contributing to these results, Wausau's Plant 3 team relied on the CE tool to involve employees and determine why people might be interrupted on the flow line. BBs Craig Briggs and Joe Millerleile involved the entire staff, from plant supervisors and managers to machine operators. "Employee involvement is the key; implement their ideas," explains Briggs. "The line employees had a say in plant layout and workstation design and creating their own tool boards."

FIGURE 1 Sample Spaghetti Chart Section



Rell also worked with a team at Plant 3 to reduce direct labor associated with machinery setup for product flow changes. Reducing setup time reduces overall lead time, meaning the customers can get their windows faster.

"The team analyzed the setup process and identified nonvalue added activities from the flowchart. These wasteful activities were reduced, and variation sources were controlled. This was a fast paced project that showed quick savings and continues to track benefits," says Rell.

As a result of its Six Sigma and lean efforts, Plant 3 increased productivity an impressive 28%. In fact, across all plants, Wausau productivity is up 8%. A large component of these productivity increases involves decreases in overtime.

Following Plant 3's lean efforts, Wausau began to more formally and actively manage its labor force, with employees now moving from plant to plant weekly as they are needed.

"Using simple Six Sigma and lean tools promotes out of the box thinking and aids in shifting toward continuous improvement," Rell adds. "More project ideas are being generated, more employees are volunteering to become Yellow, Green and Black Belts, more employees are becoming involved on project teams, and we're beginning to use the tools in our everyday jobs to improve all processes."

Helping establish early success in Wausau's adoption of lean and Six Sigma, BB Rick La Mere led a project at the company's receiving facility. Through spaghetti charts (see Figure 1) that show material and operator movement through an area, he illustrated the waste in the established material receiving process and found ways to eliminate nonvalue added activities.

"The assumption made before the charts were created was that the work area was already arranged in the most logical order and things were as good as they could get," La Mere explains. "After mapping out the process, employees were surprised to see miles of extra walking, which is one of the seven wastes of lean thinking—wasted motion. This simple tool led the culture to think differently, make some great changes in their work area and become more efficient."

Tackling Transactions

Building on La Mere's work, BB Peter Fuchs successfully implemented one of Wausau's first projects to tackle a transactional rather than manufacturing process. He examined ways to further reduce the time between customer order placements and product shipments—most effectively addressed through

the utilization of preliminary bills of material releases, called "prelims."

These prelims carry an inherent risk of cost of poor quality due to the timing and accuracy of available information. Fuchs challenged the "we can't measure that" mentality. He and his team applied the CE tool to identify measurable areas and then wrote SOPs to ensure a consistent process (see Figure 2).

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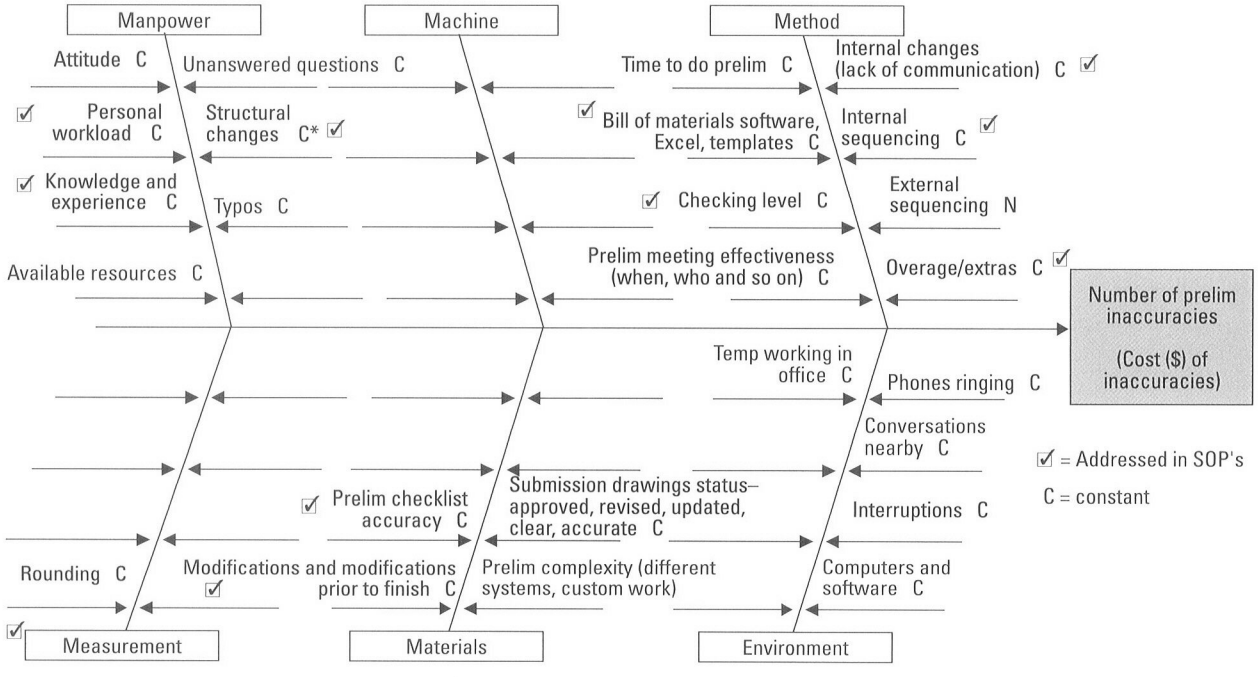
This cause and effect tool reveals Wausau's map for reducing customers' lead times through the company's prelim process. Team members measured input data on the variables highlighted in yellow. They wrote SOPs for the variables, with adjacent spaces for checkmarks.

A Green Belt (GB) project led by Mike Weis in the production planning department also overcame cultural barriers while focusing on a transactional process. Because Weis was both the GB and process owner on the project, he was able to oversee and generate a successful effort.

"Sometimes BBs and GBs can be slowed down by the line manager in the area in which the projects occur," says Weis. "As the process owner and GB in the production planning area, I was able to implement changes quite quickly and easily. More and more of our managers are directly benefiting from Six Sigma training in this way."

Also benefiting from this synergy, Weis and his team used the basic tools to create measurements

FIGURE 2 Cause and Effect Diagram



PLANT 3 BEFORE (below) AND AFTER Employees thought their work area was arranged logically until the process was mapped out. After discovering miles of extra walking, they instituted major changes leading to greater efficiencies, including reduced lead times. That means customers get windows faster.

and reduce lead times. Scrutinizing the transactions that took place between the purchasing and production planning departments, they created a measurement called "touch points." This measurement established the number of times a job was handled throughout the office.

Thanks to recommendations and improvements from Weis and his team, the team was able to help reduce the number of touch points by 30%. This success was an important part of the company's larger effort to reduce the overall lead times associated with Wausau's accelerated delivery process for its Advantage brand of pre-engineered windows.

Real Results

"Financial and cultural benefits like these continue to be achieved thanks to a companywide investment in this lean/Six Sigma initiative," emphasizes Holmberg. "It can be complicated, but simple tools like process flow maps, cause and effect summaries, constant-noise-experimental classifications and SOPs give our staff a common language for communicating effective methods to reduce variation and drive our continuous improvement culture."

Wausau continues to enhance this continuous improvement culture and pursue the maximum yield from its lean/Six Sigma investment. In addition to its BBs, the company has completed training for 26 GBs to support their efforts and plans to train 11 more this fall.

GBs further spread the culture change into the organization by leading their own smaller-scale projects and promoting their knowledge more deeply into the company.

Wausau also has eight associates trained in design for Six Sigma (DFSS), which helps develop Six Sigma concepts into products and services. "We are just beginning some projects using these concepts," says Holmberg. "Currently, we're using the DFSS tools to analyze our lean/Six Sigma initiative by reviewing the way we screen, select and assign projects, track benefits and administer our resources."

By definition, the continuous improvement journey is never over. Wausau is always looking to improve its processes and relies on its process owners to inform and involve its BBs and GBs in solving encountered challenges. Throughout the company, staff is excited with the results achieved so far and looks forward to many future successes.

LYNN MONNOT *is a quality specialist and Six Sigma Black Belt for Wausau Window and Wall Systems, Wausau, WI. She holds a bachelor's degree in production and operations management and statistics from Winona State University, Winona, MN. Monnot is a member of ASQ and is certified as a Six Sigma Black Belt through both ASQ and Apogee Enterprises.*

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